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3. Episode 140: Talking consumer trends with 210 Analytics' Anne-Marie Roerink, Part 2
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5. Episode 138: Brett Erickson discusses Certified Angus Beef's efficiency through automation

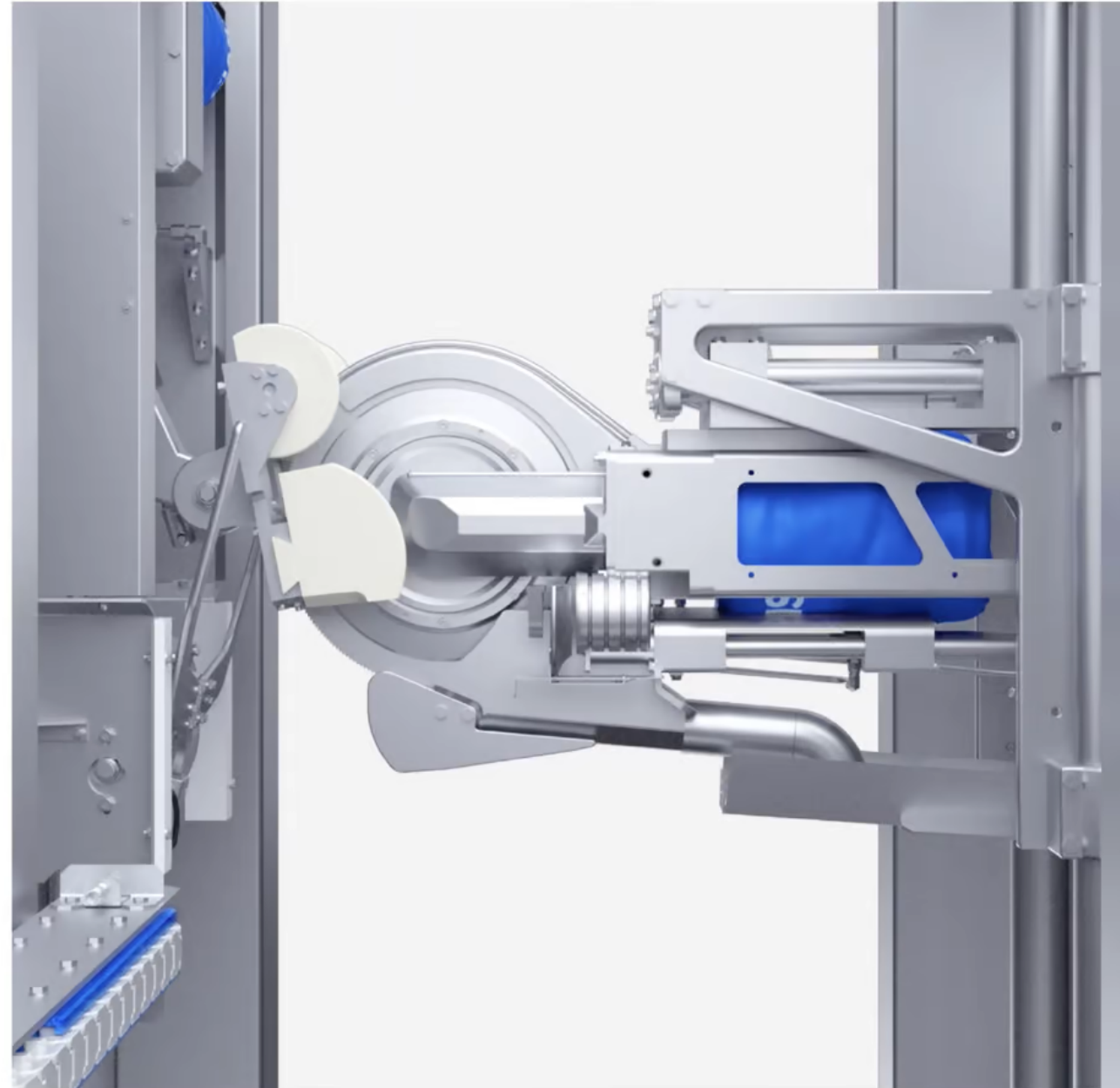
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NEW FACES AND INTRODUCTIONS

In April, we sadly bid goodbye to Sam Gazdziak, a longtime editor on *Independent Processor* and *The National Provisioner*, and an all-around champion of the meat processing industry. His leadership has long guided our coverage of the smaller-scale, independent side of meat, poultry, and seafood, while also supporting the entire industry as a whole. He will be missed, and his body of work while at BNP Media will serve as a strong foundation for future work.

Thankfully, Sam is still in the industry, so he very well may cross paths with many in *The National Provisioner* audience in the future. His new role is communications manager for AAMP, the American Association of Meat Processors. We wish him the best, and look forward to regularly collaborating with him and AAMP in the future.

In light of this development, we recently brought on Fred Wilkinson as managing editor. Fred has over two decades of experience as a journalist covering the food industry, including agriculture—most notably with *The Packer*. He has jumped right in on *The National Provisioner*, and you can see his read major feature, on our 2022 “Processor of the Year,” in this issue.

While I’ve been working behind the scenes on *The National Provisioner* for several years now, overseeing editorial direction and strategy, I will assume a larger role on the publication moving forward. I’m no stranger to meat, formerly serving as culinary editor on *Food Product Design* magazine and editor of *CULINOLOGY* for the Research Chefs Association (both addressed comprehensive retail and foodservice product R&D, including meat, poultry, seafood, and analogues). And my first love as a journalist was horticulture and agriculture, industries I covered early in my career. I’m looking forward to getting out in the meat and poultry industry this year, visiting processors and attending key industry events—connecting with people in person.

I’d love to hear from you—about the challenges you’re facing in today’s meat processing industry, and how you’re addressing those challenges. Please feel free to reach out and say hello, and start the conversation.



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PEAKS AND VALLEY

Mark Soules (left) and John Soules Jr., co-CEOs of John Soules Foods

NOT ONLY HAS JOHN SOULES FOODS EXPERIENCED HIGH-FLYING SUCCESS WITH RECORD SALES AND NEW-PRODUCT DEVELOPMENT OVER THE PAST 18 MONTHS, BUT IT ALSO BUILT A HIGHLY AUTOMATED, STATE-OF-THE-ART PROCESSING PLANT IN VALLEY, ALA., TO PUSH THE COMPANY EVEN HIGHER.

BY FRED WILKINSON
MANAGING EDITOR

VALLEY, Ala. — Thriving during challenging times has been a recurring theme in the company history of John Soules Foods.

Under the leadership of co-CEO's and brothers Mark Soules and John Soules Jr., the company has experienced a lot of change since their father, John Soules Sr., founded the company as a ground-beef operation.

Amid the marketplace disruptions caused by COVID-19, John Soules Foods posted record sales in 2020 — with 25% year-over-year growth — followed by another record-breaking year in 2021, with an additional 22% growth. The current year is following a similar arc, with 2022 sales so far continuing to set records by pacing at 22% dollar sales growth through the first quarter of the year. John Soules Foods has enjoyed its top five individual sales weeks in company history during Q1 of 2022.

Based on this record of success and the company's state-of-the-art expansion in Valley, Ala., *The National Provisioner* is pleased to award John Soules Foods its 2022 Processor of the Year award.

Some of John Soules Foods recent product development and merchandising achievements include:

- Currently the market share leader with over 50% share of the refrigerated fully cooked strips category.
- The company is the exclusive licensing partner (fully cooked proteins) of "Hot Ones," the YouTube pop culture show from *First We Feast*. The partnership began with a "Hot Ones" limited-time offering retail item at Walmart earlier this year, which became the company's No. 3 item at Walmart in the frozen department and No. 5 overall. It contributed to 40% of John Soules Foods' overall growth at Walmart in the frozen department in Q1. This summer, the limited-time item will be replaced by an everyday lineup of five individual items, each featuring a different Hot Ones® sauce.
- This summer, John Soules Foods becomes the exclusive licensing partner (fully cooked proteins) for Universal Studios, including the "Jurassic Park," "Minions" and "Trolls" movie franchises. The timing aligns with the release of "Jurassic World 3: Dominion" in June, "Minions: The Rise of Gru" in July, "Trolls 3" in November 2023 and "Despicable Me 4" in July 2024.
- The company introduced AmaZings™, a line of trimmed, bone-in chicken thighs that provide a "wing" eating experience, available in Buffalo, Honey BBQ, Garlic Parmesan and Lightly Seasoned flavors. With a limited launch at Walmart in March, everyday retail placement begins in summer 2022.
- In March, John Soules Foods launched individually packaged Chicken Bites at Sam's Club in the refrigerated section. The six-pack of individually portioned 3-ounce packages is designed to give consumers flexibility for individual consumption — such as a salad topping or for snacking — and ties in with consumer interest in healthy eating and the rise in protein snacks. The item is currently available in a Thai Style Chili Teriyaki flavor.



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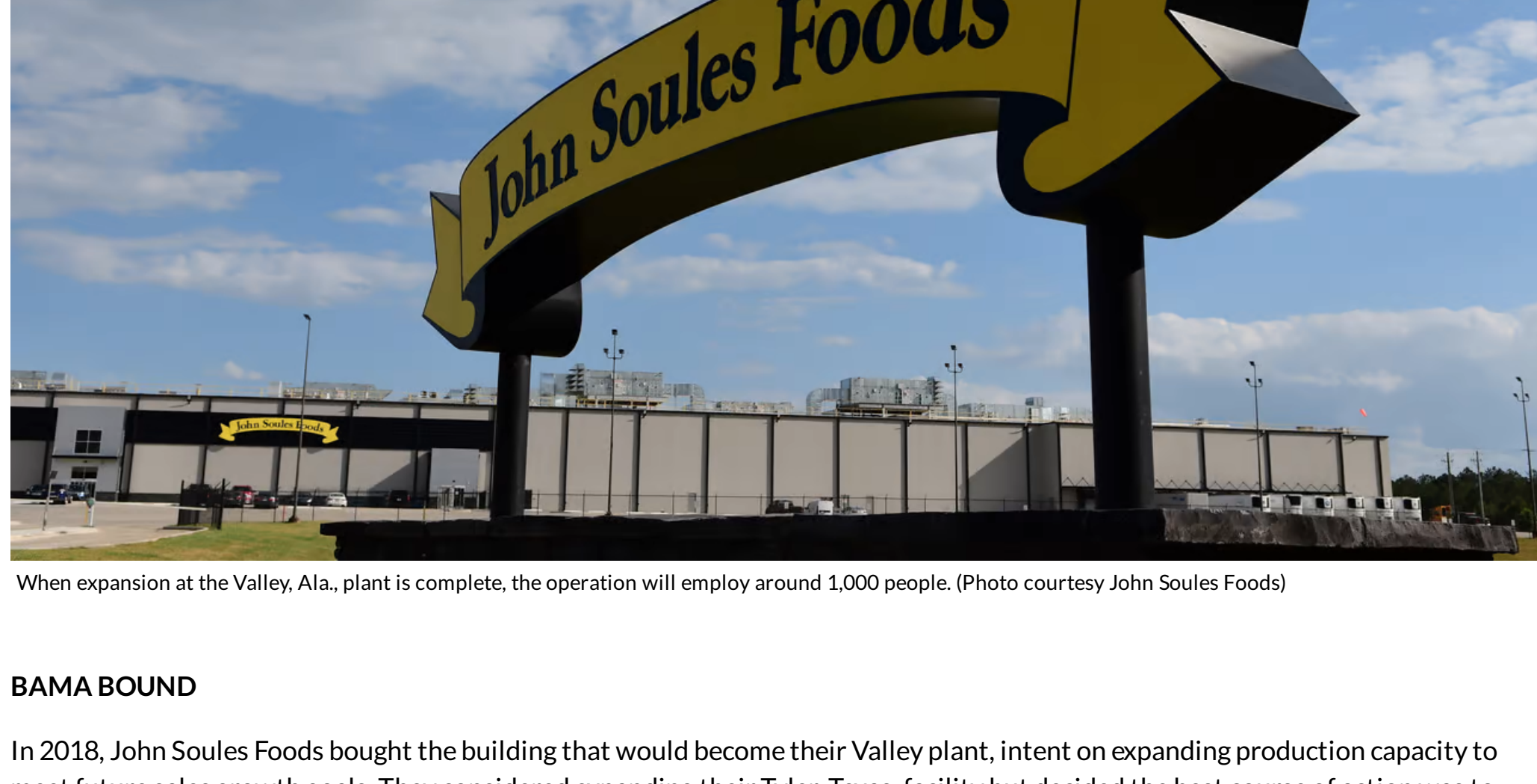
Sixteen-year company veteran and Senior Director of Research & Development Lance Youngs leads a team of culinary professionals and food scientists that collaborates with marketing and sales to build an innovation pipeline and bring new products to market.

The innovation continues with packaging. A resealable package for John Soules Foods Rotisserie Seasoned Chicken recently won a Silver award for Technical Innovation in the 66th annual Flexible Packaging Achievement Awards competition. The packaging was recognized for a laser score that audibly "pops" when opened to assure consumers that the package has not been opened previously. The company's Hot Ones Boneless Chicken Bites was also recognized as a 2022 American Package Design Award Winner by Graphic Design USA, via FoodStory Brands, which led the design efforts in conjunction with John Soules Foods and Complex Media.

John Soules Foods' growth and innovation in product development and timely, high-profile product tie-ins alone would make it a worthy candidate for *The National Provisioner's* Processor of the Year, but the clincher for the company's win came from pulling off the design, construction and startup of its state-of-the-art plant in Valley, beginning the project during the pandemic and bringing it on line in September 2021.

Not surprisingly, that accomplishment is a point of pride.

"If we can get them in this plant, then we're going to bring in a customer," John Jr. said during *The National Provisioner's* exclusive visit to the facility this spring.



When expansion at the Valley, Ala., plant is complete, the operation will employ around 1,000 people. (Photo courtesy John Soules Foods)

BAMA BOUND

In 2018, John Soules Foods bought the building that would become their Valley plant, intent on expanding production capacity to meet future sales growth goals. They considered expanding their Tyler, Texas, facility but decided the best course of action was to add a new production location that could replicate the production capabilities of both their Tyler (grilled items) and Gainesville, Ga., (breaded items) facilities.

"Valley serves as a very important backup for us," John Jr. says. The Valley plant increases short-term capacity by about 50%, adding up to 100 million pounds of annual capacity on two new lines (on top of the 200 million pounds of capacity in their Tyler and Gainesville facilities).

The empty facility purchased in Valley — the layout of it, how it was constructed, the fact that the structure was more of a rectangle than a square, the site's location in the southern part of the United States, the proximity to suppliers — made it a perfect building block for what they wanted in their new plant, John Jr. explains.

"We looked from Texas all the way to South Carolina really, and this was just the building that kind of jumped out to us," he says.

They also found cooperative development partners among state and local officials, Chief Operating Officer Tom Ellis says.

"The City Council and the mayor have really embraced John Soules Foods coming to the community," Ellis says, with the plant diversifying the area's manufacturing base, expanding the sales tax revenue base and adding almost 400 jobs to the community.

When expansion at the Valley plant is complete, the operation will employ around 1,000 people, John Jr. says.

THE CITY COUNCIL AND THE MAYOR HAVE REALLY EMBRACED JOHN SOULES FOODS COMING TO THE COMMUNITY," ELLIS SAYS, WITH THE PLANT DIVERSIFYING THE AREA'S MANUFACTURING BASE, EXPANDING THE SALES TAX REVENUE BASE AND ADDING ALMOST 400 JOBS TO THE COMMUNITY.



The Valley plant incorporates robotic equipment to erect boxes, place packages into boxes, close boxes and palletize boxes. (Photo by Andy Hanacek)



Operations in Valley increase short-term capacity by about 50%, adding up to 100 million pounds of annual capacity on two new lines. (Photo by Andy Hanacek)

FASHIONING THE FACILITY

"We decided to start building it right before COVID hit," John Jr. says. "So that was a nightmare, to say the least. That delayed us until basically mid-2020 before we could really start."

In addition to COVID-related challenges regarding sourcing building materials, along with associated price increases, John Soules Foods' major expansion coincided with related labor supply issues.

That led to incorporating some automation that wasn't in their original budget.

"All of the automation equipment wasn't originally in the plans," John Jr. says. "After seeing the impact of COVID on labor supply, we knew we needed that."

The Valley plant incorporates robotic equipment to erect boxes, place packages into boxes, close boxes and palletize boxes. Mobile industrial robots then pick up the loaded pallets and deliver them to the shipping staging area.

While the automation is impressive, an implementation of this scale isn't completed without some hiccups.

"We've seen some little mistakes and made adjustments. We have a few more to go, and by the fall we expect this to be one of the most efficient plants out there with the mix of robotics and labor," John Jr. says.

One of the big decisions was which oven to use. John Soules Foods had one type of oven operating in Gainesville and another type in Tyler. Also, the Valley production line could run 40% to 50% more product, about 15,000 pounds an hour compared with 10,000 pounds an hour each at the Tyler and Gainesville plants.

They had to figure what cooking setup could accomplish that, and then what automation on the back end could handle those speeds. Senior Director of Operations Greg Nichols worked with vendors to figure out layout configurations and bag speeds, what kind of packaging to use and how to employ robotics.

"We've had a steep learning curve with how to handle the speeds at which these lines can run," Nichols said. "The transition from the cook line to packaging is the current bottleneck. Our equipment is capable of running at higher speeds, but the products are coming so fast to the packaging side, we keep it pulled back a bit."

According to John Jr., the Valley plant should be running close to 80% to 90% of those speeds in the near future. Once they get up to full speed with the lines currently in place, putting in new lines should be similar and those add-ons should go more smoothly than the startup at the plant, he says.

"Valley is far beyond Tyler and Gainesville," Nichols says. "And at the same time, we are learning from what we have purchased and installed here and looking at opportunities at those other two facilities to try to move toward more automation."

Other Valley facility construction highlights include:

- 100% stainless steel drain systems
- 100% stainless steel conduits in the plant
- stainless steel walls and ceilings, even in the raw areas
- airtight and watertight wall curbs and transitions to stainless steel wall panels
- no air-handling/conditioning units suspended in the processing areas.

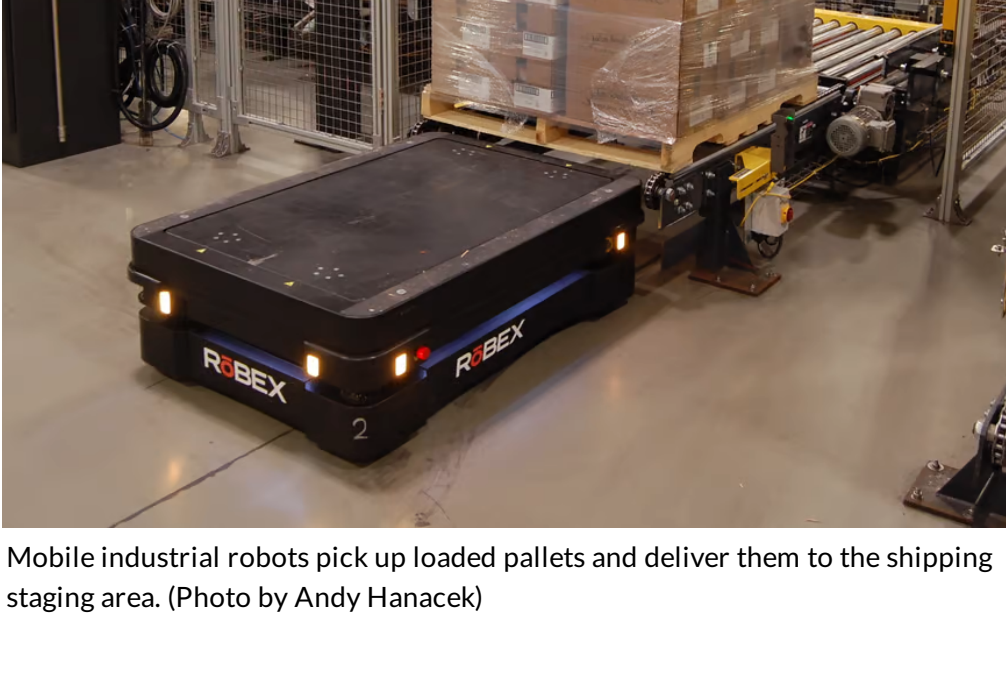
To ensure food is free of pathogens, a plant-wide misting system fogs processing rooms with a no-rinse, 24-hour residual protection designed to kill *Salmonella*, *Campylobacter* and *Listeria*, along with COVID. Bipolar ionization kills any incoming airborne viruses in air handling units that might make it through the HEPA filters.

"Our micro counts here have been better than at our other facilities just because of the way that we designed it ... and how well everything flows," John Jr. says.

With Phase One complete, John Jr. says. With Phase Two — the addition of two more production lines — is already ramping up because of rapid sales growth, Ellis says.



Plant Manager Colhan Sharp (from left), Production Manager Craig Allen, National Provisioner Managing Editor Fred Wilkinson and Senior Director of Operations Greg Nichols check out a chicken breast processing line. (Photo by Andy Hanacek)



Mobile industrial robots pick up loaded pallets and deliver them to the shipping staging area. (Photo by Andy Hanacek)

FINDING OPPORTUNITIES

Executing a major expansion amid the COVID-19 material and labor shortages wasn't ideal timing to say the least, but it wasn't the first time that challenging times wound up helping John Soules Foods grow.

In 1994, when a fire occurred at the original John Soules Foods' Tyler facility, the company had two plants. Because of the fire, all they could run was the value-added plant, John Jr. says. Around that time, Mark Soules got a call asking if they could make raw marinated fajitas for retail like they did with foodservice. That one phone call opening the door to retail would forever change the company's trajectory, leading to a shift toward fully cooked proteins and a booming retail business.

"Retail is 50% of the business now," Mark says.

Another crisis that became an opportunity was the Great Recession in 2008.

"I scared us to death because we had just doubled the size of the facility in Tyler," Mark recalls. "When you double the size of your facility, you also double the expenses and ... we didn't know what the recession would do. Because a lot of our business at that time was still in foodservice."

However, the company was positioning itself more toward retail growth at that time, John Jr. adds.

"Retail growth was really the expansion," he says. "And then what happens in a recession? Nobody eats out, everybody eats at home and our retail brand just really took off at that point."

As tight labor availability continues to hamper the restaurant business — this time because of the COVID-19 pandemic and its aftermath — fully cooked products are attracting new attention from restaurant chains.

"Restaurants can't get employees either. So what's their option? To go to fully cooked," Mark says.

As a result, John Jr. says, restaurant chains that John Soules Foods hasn't partnered with in the past have approached the company to inquire about trying some fully cooked products in their stores.

"If you look at major turning points, even the ones perceived as more negative at first — the fire in 1994, the financial crisis that 2008 and then COVID — we've done better in the bad times," Mark says. "You're going to go through a time in your business life that feels like you're going through hell. I don't care who you are or what you do, but you keep on going. Don't slow down. Intensity makes up for a lot of sins."

With that company history in mind, Mark finds the idea of setting and sticking to a "five-year plan" to be overrated most of the time.

"You can't plan for a pandemic," he says. "You don't plan that, and because people stay at home, most restaurants were closed, except for some takeout. We had the No. 1 brand of refrigerated fully cooked chicken. And because of that, I think we picked up a lot of traction on sales because people weren't going to the restaurants and they helped build the brand. So now, half of the United States that goes and buys fully cooked grilled chicken, over 50%, are buying our product."

THE ROAD AHEAD

Even as John Soules Foods gears up for its Phase Two expansion, company leadership is looking down the road with plans for Valley.

John Jr. says the company has plans to install three more lines in Valley, then is likely moving on to other opportunities for growth.

"I see both brick and mortar expansion still coming," he explains. "Tyler does actually have the ability to expand. We've got about 67 acres there, and we're not on a huge portion of that. So that's the brick and mortar side. As for acquisitions, we're just going to wait and see."

It should be no surprise that the company founded in beef but having grown into a multi-species processor might expand to other categories.

"I think you'll see John Soules Foods not necessarily be all protein-based in the future," John Jr. says. "I see us being a food company that is extremely diversified in our product offerings."



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THE CONTINUING DECLINE IN THE NUMBER OF RECALLS SUGGESTS THE INDUSTRY IS DOING A BETTER OVERALL JOB PRODUCING SAFE FOOD.

BY SHAWN K. STEVENS
FOOD INDUSTRY COUNSEL LLC

It's usually a bad day for a meat or poultry processor when USDA calls and states that the agency has discovered a problem with a product that will likely trigger a recall. Whether the problem is linked to an impermissible pathogen, an undeclared allergen, or a foreign material, the results are typically the same. The company, upon learning of the existence of a problem, will work to quickly and expeditiously identify the source of the issue and, if additional action is required, the scope of the potential recall. Once a recall is announced, the losses can be extreme. These include the costs of transportation, destruction, replacement and exorbitant retailer fees – not to mention the potential impact to the overall brand.

Fortunately, in terms of recalls, the past few years have been kind to the processing industry. Or, stated differently, the processing industry has been kind to itself. While, five years ago, reading about 50 or more recalls in the first four months of each calendar year was not unheard of, the numbers of USDA-regulated product recalls have dropped in more recent years to record lows.

Indeed, so far this year, there have only been (at the time of this writing) a dozen recalls of USDA-regulated products. This follows a record low of only eight recalls in the first four months of 2020, and 15 recalls in the first four months of 2021. While many attributed the extreme decrease in the numbers of 2020 recalls to COVID-related distractions (perhaps, causing USDA to become less focused on product safety), the continuing decline in the overall numbers of recalls in 2021 and so far in 2022 suggests, instead, that the industry is likely doing a much better overall job producing safe food.

“ONCE A RECALL IS ANNOUNCED, THE LOSSES CAN BE EXTREME. THESE INCLUDE THE COSTS OF TRANSPORTATION, DESTRUCTION, REPLACEMENT AND EXORBITANT RETAILER FEES – NOT TO MENTION THE POTENTIAL IMPACT TO THE OVERALL BRAND.”

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Of the 12 recalls that have been announced this year, six were announced because of an undeclared allergen, three were announced because the products were produced without the benefit of USDA inspection, two were announced because of the presence of an impermissible pathogen (one for *E. coli* O157:H7 in ground beef, and the other for *Listeria monocytogenes* in ready-to-eat beef jerky products), and one was announced because of a process deviation – in essence, 30,000 pounds of a ready-to-eat chicken product was found to be undercooked.

By way of protein categories, there have been six recalls involving beef products, four recalls involving poultry products, one recall involving pork and one recall involving catfish. Yes, in addition to beef, poultry, and pork, USDA also regulates catfish. The unescapable conclusion from the low recall numbers in 2022 is that all segments of the meat and poultry (and catfish) industries appear to be doing very well when it comes to overall product safety.

So, congratulate yourselves for kicking off what appears will be a great year in food safety. And, keep up the phenomenal work. With continued compassion and commitment, you may be well on your way to making 2022 one of the safest meat and poultry years ever.

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Inside Kerry's Expanded Coatings and Breadcrumbs Plant

Kerry's recent \$125 million expansion of its Rome, Georgia, facility gave the company a chance to address soaring market demand for coatings and breadcrumbs, while implementing several engineering and technological innovations to boost productivity, cost savings, sustainability and efficiencies throughout. Aleisha Jaeger and Christina O'Keefe detail the impact engineering has had on this project, which added 30% more production capacity.



PRESENTED BY

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Tyson

How Tyson Uses Automation to Transform its Case-Ready Meat Operations

Tyson Foods built its new \$300 million, 600,000-square-foot case-ready meats plant in Eagle Mountain, Utah, with an eye firmly on the future. The greenfield project gave Tyson a blank slate for incorporating automation in every area of the facility for maximum efficiency, speed, productivity, labor savings and staff safety. Tyson's Brady Welu explores how automation has transformed today's case-ready operations and the lessons learned along the way.

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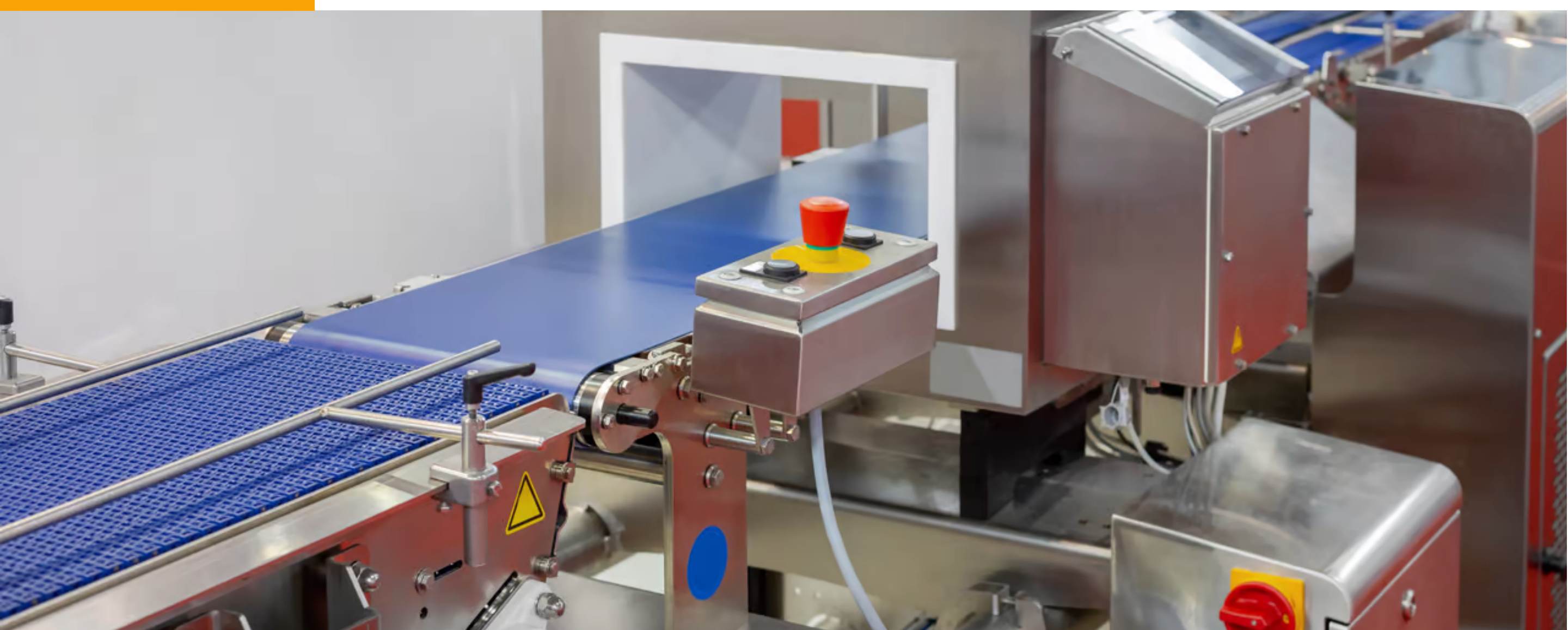
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X-RAY AND OTHER TECHNOLOGIES CONTINUE TO IMPROVE AND PROVIDE CRITICAL DETECTION METHODS FOR MEAT PROCESSORS.

BY FRED WILKINSON
MANAGING EDITOR

While food safety efforts to prevent microbial contamination of product are top of mind for every meat and poultry processor and product handler, the related production consideration of preventing foreign materials introduction is equally important. Although foreign materials contamination of food products does not pose the same threat for contamination as a microbial threat such as *Salmonella*, X-ray and metal detection systems are essential components of industry food safety plans. There also is growing processor interest in and use of vision systems for foreign material detection and quality control.

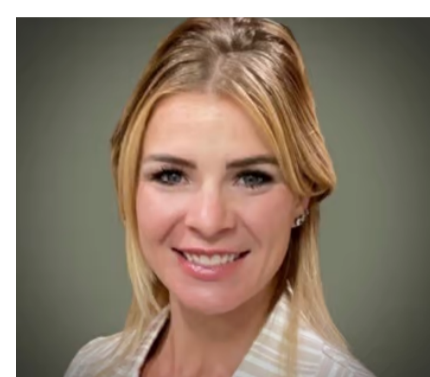
Despite whatever array of detection technologies processors implement, it is just one part of a company's comprehensive foreign materials detection and prevention commitment.

"No detection method is perfect, and all possess the potential for false predictions, to some degree," said Casey Lynn Gallimore, director of regulatory policy at the North American Meat Institute (NAMI).

Although USDA does not specify a regulatory requirement specific to foreign materials prevention, NAMI has compiled best practices to guide processors in setting up foreign material prevention procedures.

"There is no regulatory requirement specific to physical hazards in product, except for meeting the Federal Meat Inspection Act of providing safe, wholesome, unadulterated meat products," Gallimore said. "USDA does not identify a certain size limit of a physical hazard, where anything above a certain size or dimension would be a hazard. FDA has standards for what is allowed as limits in FDA-inspected product. It is recommended to use those limits in meat products, unless other support is available."

Using these limits would support whether or not product was safe for consumption and would also aid plant workers in identifying if the product is salvageable or not, Gallimore said.



ABBIE DAVIDSON



CASEY GALLIMORE

ALTHOUGH FOREIGN MATERIALS CONTAMINATION OF FOOD PRODUCTS DOES NOT POSE THE SAME THREAT FOR CONTAMINATION AS A MICROBIAL THREAT SUCH AS SALMONELLA, X-RAY AND METAL DETECTION SYSTEMS ARE ESSENTIAL COMPONENTS OF INDUSTRY FOOD SAFETY PLANS.

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For example, if sawdust fell into some chopped and formed product and this was realized after the fact and the sawdust pieces were smaller than what has been identified by FDA as a hazard. The issue would become a quality issue at that point, she said. USDA-FSIS considers all product with foreign material to be adulterated regardless of the size, shape or any other characteristics of the material.

"Though that sounds good in theory and the industry has made significant improvements to reduce the occurrence of foreign material in meat and poultry products, it is an unrealistic standard that is inconsistent with FDA enforcement of other foods," Gallimore said. "Having zero foreign material is an admirable goal, but companies are better served using a risk-based approach with a zero-tolerance standard for foreign material that would be a food safety hazard."

Through participation in an industrywide partnership of meat and poultry associations, NAMI has compiled and outlined key questions processors must address and approaches they can employ when designing and implementing a foreign material control and prevention program. NAMI's "The Meat and Poultry Industry Foreign Material Manual" is designed as a comprehensive information resource for processors to consult when crafting their foreign material control efforts for prevention, detection and response.

Different processing applications necessitate tailored solutions for foreign material control and prevention. Best practices and equipment for a hamburger line, chicken wings or hot dogs can have unique aspects. Processors' foreign material control and prevention programs should start with risk assessment to identify potential areas for foreign materials introduction during the production process.



"There is no silver bullet or magic one-size-fits-all solution for foreign material control and prevention," Gallimore said. "It is important to design a program that is robust and grounded in a robust risk assessment. Though there are some processes where a single control or prevention method might suffice, we generally recommend a multi-hurdle approach, and the risk assessment will drive the number and type of methods to use."

Processors must also keep in mind that risk assessments should be re-evaluated as significant changes to the production process are incorporated, such as a new product line, new materials or new vendors.

"The essential best practices for ensuring the metal detection and X-ray technology are functioning as intended are ensuring the calibrations are conducted at appropriate intervals, and that corrective actions, when needed, address the issue," said Abbey Davidson, outreach specialist at the American Association of Meat Processors (AAMP). "Processing facilities that only process a few hundred pounds of product a day."

She said that having a product-hold procedure in place to prevent the risk that product with potential physical hazards is released into commerce is essential, adding that well-trained staff members are vital in making sure sound procedures are implemented and followed.

For metal detection systems, for example, metals with high electrical conductivity like aluminum or brass retransmit a stronger electromagnetic field and are easier to detect. In a meat processing operation, however, stainless steel (one of the most common metals used in meat and poultry processing environments because of its anti-corrosive properties) has low electrical conductivity and can be more difficult to detect. This is why different sizes of standards are often used for calibration.

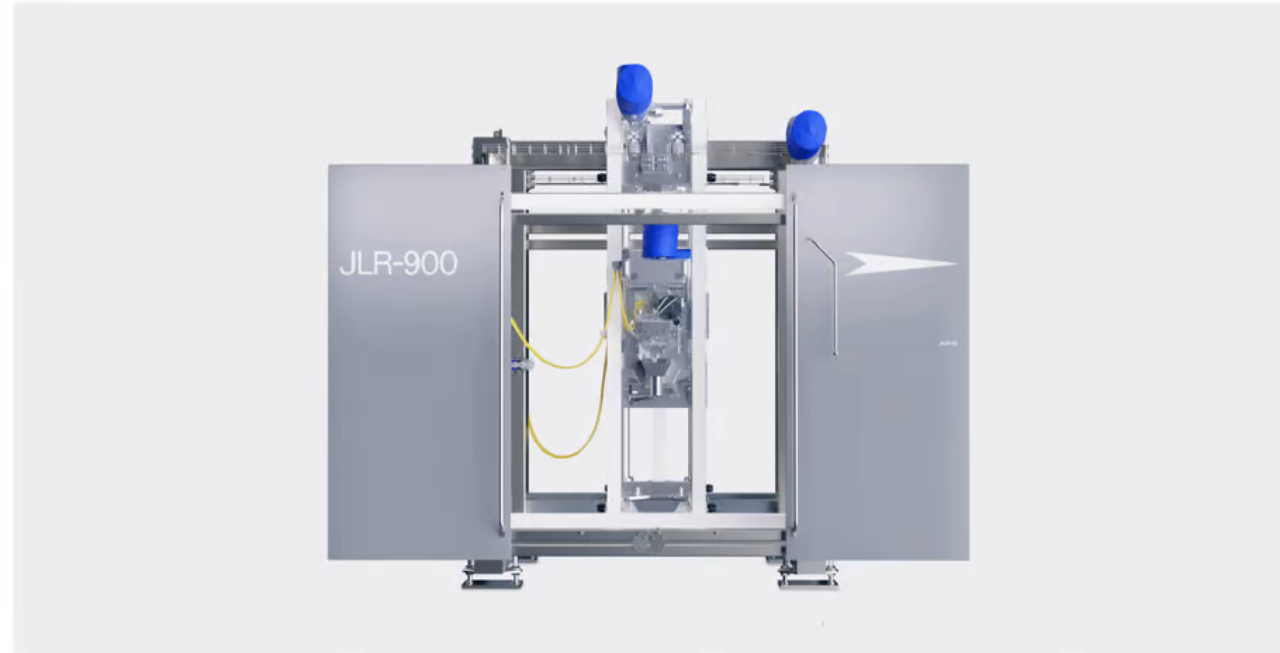
"Making sure that the different types of metal are calibrated for ferrous, non-ferrous and stainless steel is vital," Davidson said. "These types of equipment can be finicky, so working with and understanding how your specific piece of equipment operates will save much headache in the long run."

She added that the second part to this is that staff knows and understands proper use and calibration of detection systems and implements the important actions when issues arise.

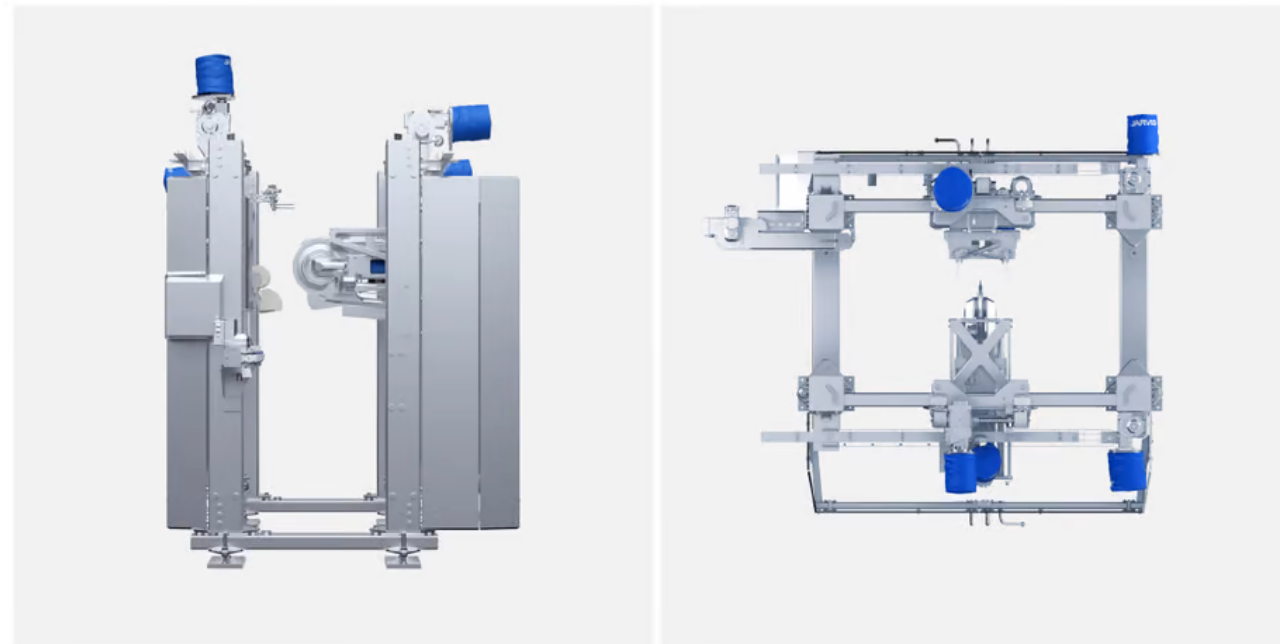
"This means that staff knows how to identify the implicated product, segregate it from other products, understand what to do in the event the product cannot be used, and how to find that out," she said.

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THREE-PHASE SOLUTION

FOR SMARTER COOKING

SPIRAL OVENS OFFERING IMPROVED AIRFLOW CAN IMPROVE PRODUCT QUALITY AND YIELD.

BY BEN KOP, FOOD TECHNOLOGIST, GEA

Overcooking caused by temperature variation across the belt is a challenge for food manufacturers due to its detrimental impact on yield and product quality. It's a major drawback of ovens with air velocity going in only one direction. However, technology is available to create a product of the same quality as a conventional rotary spit, but on a much larger scale so that anyone, anywhere can walk into a supermarket and enjoy well-cooked meat or poultry.

The introduction of spiral ovens with improved airflow that goes from top to bottom and left to right has changed the ball game in terms of quality, efficiency, and yield. To further optimize capacity, three-phase technology has been developed with even more precise process control. Three-phase spiral ovens can be used for roasting pork, beef, chicken, meat substitutes, formed uncoated products, marinated products, steamed products and dried or smoked meats.

Consumption of meat and meat replacement products is on the rise. This new generation of ovens provides an extremely accurate, high-performance solution that pushes the art of cooking to produce even more of what the meat industry wants: increased yield and improved sustainability, as well as high-quality products.

Optimized airflow is the key. A combination of horizontal and vertical airflow means maximum precision and flexibility in controlling the cooking conditions to best suit the application. Heat is distributed more evenly across the whole width and length of the belt, providing uniform cooking. The high level of controllability means that meat and poultry products can be cooked in a way that provides reproducible results time after time.

Tests at our technology center show an increase in yield of up to 5% depending on the applications, with fewer overcooks and shorter cooking times compared to its predecessors. Manufacturers can set each zone in the oven to a precise recipe, providing more-targeted cooking and consistent browning, while reducing any waste caused by overcooking.

An enhanced impingement zone gives a higher air volume for greater cooking impact and efficiency, meaning lower power consumption. Yields can also be improved for coated products, as the improved airflow enables a crispier coating without drying out the juicy product core. Generating extra heating capacity translates into the potential of increased throughput.

So what benefits are provided in three-phase cooking? It's the ability to accurately control the cooking parameters. The first phase utilizes the latent heat of steam to cook quickly and gently, keeping meat succulent by preventing moisture loss. Then, the impingement zone blasts the product with hot, dry air to remove excess humidity and prepare the surface for coloring or roasting without drying out the core. The final phase develops the coloring to complete the process, cooking products to perfection.



However, three-phase cooking equipment should not be a mystery. Training is important so that operators get the best out of the equipment to capture the authentic flavors of each product, which requires correct timing, airflow, dewpoint and temperature within the oven. Since every manufacturer has its own unique process or product, high transparency and expert backup are crucial.

The optimum setting for any individual product is a compromise. A high dewpoint improves yield but prevents browning. A lower dewpoint browns the meat but dries it out. The latest three-zone ovens now come with smart climate and exhaust systems that allow increased flexibility and sustainability.

Intelligent exhaust systems monitor the environment within the oven continuously, adjusting the volume of exhaust air as needed to maintain the precise atmospheric conditions required for optimum cooking. By only using energy exactly as needed, this technology can also reduce heat and steam losses, helping reduce power consumption.

All in all, the emerging generation of this industrial cooking technology lets meat processors add a high degree of flexibility to their production lines. The increased use of "intelligent" systems is giving manufacturers the ability to control distinct parameters according to changing consumer demand, while still providing high productivity, sustainability, reliability and total security of outcome.

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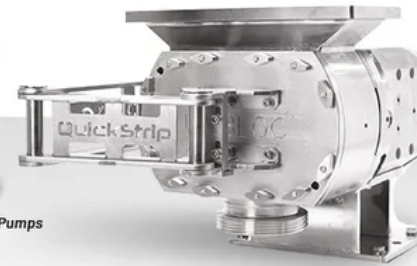
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TUMBLING WITHOUT BRINE INCLUSION:

A NEW STRATEGY FOR TENDERIZING BEEF?

RESEARCH SUGGESTS IT COULD ALLOW FRESH BEEF STEAKS TO REACH DESIRED TENDERNESS IN LESS TIME.

BY JACOB R. TUELL, QIANQIAN YU, AND YUAN H. BRAD KIM

Tenderness of fresh beef is an area that has been studied extensively in meat science research. Recently, it has been assessed that if a steak is rated by a consumer to have acceptable tenderness, the likelihood of overall palatability being unacceptable would be only 10% (O'Quinn et al., 2018). Undoubtedly, the industry has made considerable progress in improving the tenderness of beef in the US, as documented by the National Beef Tenderness Surveys (Gonzalez & Phelps, 2018). However, considerable lengths of postmortem aging are often used to achieve this. For instance, the latest National Beef Tenderness Survey reported the mean post-fabrication aging time for strip loins would be 27.2 days (Martinez et al., 2017). Considering this, we began examining potential strategies that could allow fresh beef steaks to reach the same level of tenderness in a shorter time.

Taking inspiration from the meat processing industry, we examined if tumbling would have beneficial impacts on the quality attributes of fresh beef loins. Although tumbling is nearly universally applied alongside enhancement with a brine or marinade solution, we questioned if brine inclusion was truly a necessary component for fresh meat application. One previous study conducted by Morrow et al. (2019) suggested that it was. Beef flanks that were tumbled in the absence of a marinade did not have similar improvements in palatability compared to those tumbled with a marinade (Morrow et al., 2019). However, considering the flank is a sheet muscle with large muscle fibers and a high content of connective tissue, we proposed that tumbling alone could exert some positive effects on the quality attributes of beef loins. Additionally, we intended to examine if additional postmortem aging applied after the tumbling process would have added benefits, potentially showing synergism between physical disruptions and proteolytic degradation.

ALTHOUGH TUMBLING IS NEARLY UNIVERSALLY APPLIED ALONGSIDE ENHANCEMENT WITH A BRINE OR MARINADE SOLUTION, WE QUESTIONED IF BRINE INCLUSION WAS TRULY A NECESSARY COMPONENT FOR FRESH MEAT APPLICATION.

To accomplish this, we took beef loin muscles from nine USDA Select carcasses and divided each into three equal length sections. Each section was then vacuum-packaged within two layers of 3-mil packaging to ensure the bag maintained its seal over the course of tumbling. Sections were then divided among our treatment groups: T0 (non-tumbled), T60 (tumbled for 60 min at 8.5 rpm), and T90 (tumbled for 90 min at 8.5 rpm). At the completion of tumbling, steaks were cut from each section to be further aged for an additional zero, seven or 14 days.

Tenderness was assessed by Warner-Bratzler shear force (WBSF) values. Immediately after the tumbling process, we observed a considerable decrease in WBSF in the T60 (29.0% decrease) and T90 (37.9% decrease) groups relative to the T0 controls. In fact, steaks from sections that were not tumbled took an additional 14 days of aging to reach a comparable WBSF level to what was achieved immediately after the tumbling process (Figure 1). To support these findings, we conducted several other assays related to beef tenderness. Tumbled loins had greater myofibrillar fragmentation index values, which was supported by obvious fracturing of the myofibrils when examined microscopically. Further, there was evidence to suggest that tumbling facilitates degradation of myofibrillar proteins during the aging process, shown by less abundant intact troponin-T.

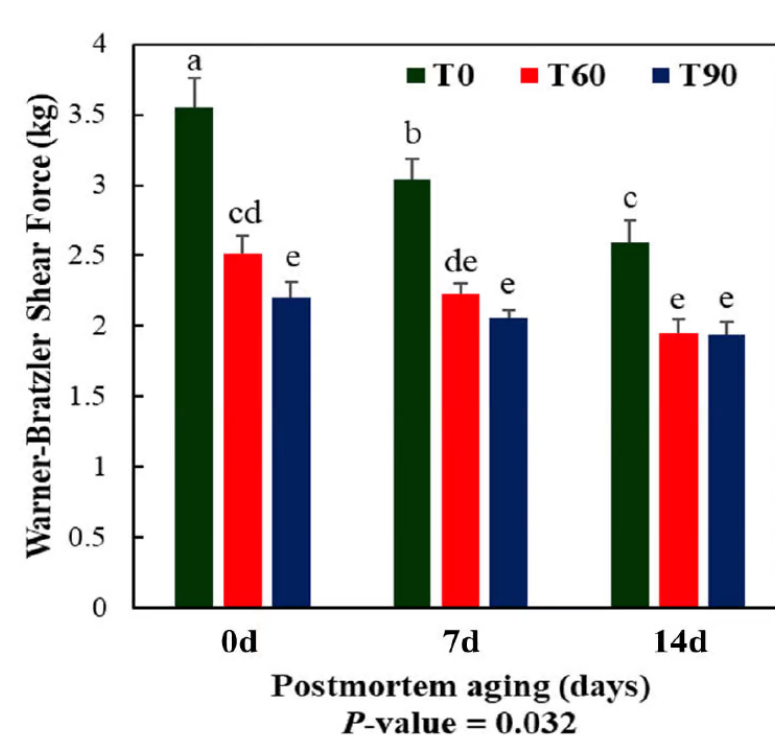


Figure 1. Warner-Bratzler shear force values of tumbled and aged beef loin steaks.

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Although there were obvious benefits to tenderness obtained through tumbling without brine inclusion, the method did have some drawbacks. Unsurprisingly, tumbled steaks lost significantly more moisture during the cooking process, which may be expected to negatively impact juiciness. However, since conducting this study (published in *Meat and Muscle Biology*; <https://doi.org/10.22175/mmb.13044>), we have assessed eating quality attributes through consumer panel. In our follow-up study (accepted for publication in *Journal of Animal Science*), consumers rated tumbled loins as having greater tenderness liking and overall liking compared to those that were not tumbled, with no negative impacts to juiciness or flavor.

Accordingly, tumbling without brine inclusion, combined with additional postmortem aging, could be an effective, novel strategy for improving beef palatability. While most loin steaks in the U.S. do reach acceptable levels of tenderness before reaching the consumer (Martinez et al., 2017), tumbling could potentially be used to achieve this sooner after harvest. We have since been conducting follow-up experiments to determine the effectiveness of the process under situations where toughness is more of an issue, including cuts from the round and sirloin primals, as well as loins from cull cows. While there is undoubtedly more work that must be done before industry application (e.g., identifying the optimal tumbling regime and assessing food safety), our research does show promise for this strategy as an effective, simple, and natural method for processors to implement to provide consumers with guaranteed tender products.

ACKNOWLEDGMENTS

This work was supported by the U.S. Department of Agriculture's National Institute of Food and Agriculture, Hatch-Multistate project 1006773 and funded in part by the Beef Checkoff.

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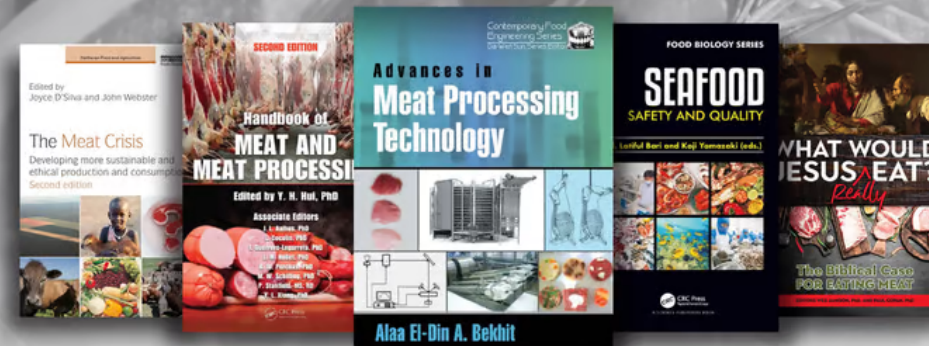
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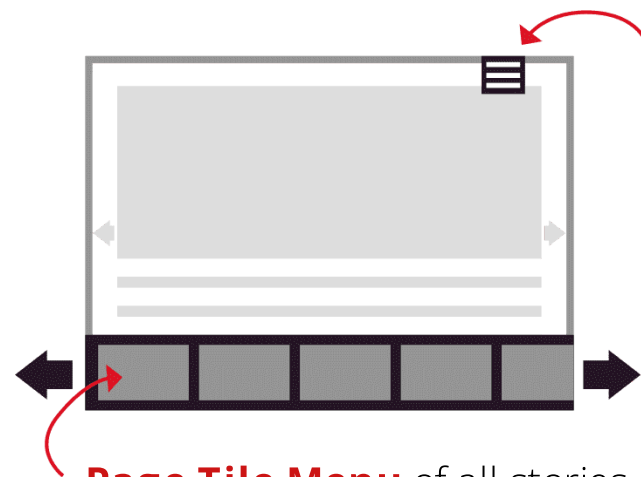
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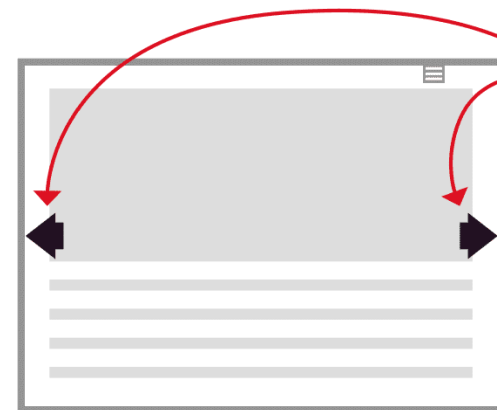
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